Iowa Science Teachers Journal

Volume 15 | Number 1 Article 15

1978

The Cecropia: An Incredible Eating Machine

Linda B. Hoffman
Adel-DeSoto Community Schools

THE CECROPIA: AN INCREDIBLE EATING MACHINE

Linda B. Hoffman
Junior High Instructor
Adel-DeSoto Community Schools
Adel, Iowa 50003

Introduction

One of Iowa's most dramatic, native insects is the cecropia moth, *Hyalophora cecropia*. The larvae of this large, woodland moth feed on the leaves of native trees such as birch, maple, ash, willow, elm, apple and wild cherry (Swan and Papp, 1972). The adults are most prevalent in Iowa in late spring and early summer. In late summer the most prevalent stage is represented by large, distinctive caterpillars. In late fall, the dominant stage is the spindle-shaped, pupal cocoons found attached to the twigs of deciduous trees or in liter at base of trees.

The usual mode of rearing cecropias in the classroom, is to collect larvae in the fall, place them in rearing cages until they pupate and observe their emergence the next spring (Hussey and Pessino, 1975). Another method simply involves walking in the woods, after the leaf fall, and collecting the cocoons which are more apparent on the leafless twigs of host trees. The cocoons are then placed in rearing jars for observation in the spring. In this paper, a third method will be discussed. This method involves the rearing of cecropia moths from eggs. The project started when a female cecropia moth was brought to class for identification. The female layed eggs on the side of the container and the eggs began to hatch. Not infrequently, even freshly "dispatched" females will continue to lay eggs even on a mounting board! The oviposition reflex may even continue for several hours after females are killed with cyanide or chloroform.

Materials

The materials needed to rear cecropia moths from eggs are simple and inexpensive. Besides patience and perseverance, you need the following materials:

1. Several large paper sacks for oviposition.
2. A camel's hair brush for handling small larvae.
3. Several large, gallon jars for rearing.
4. Several rubber bands.
5. Some discarded nylon stockings or panty hose.
6. Aureomycin-kanamycin sulphate solution.
7. Host-plant food such as apple or cherry leaves.
8. Windex sprayer.

Procedure

1. Obtain a female cecropia moth, in late spring, by establishing a light trap in a densely wooded area.

2. Place the female in a large, paper sack as outlined by Tashenburg and Roelofs (1970). The female does not have to be fed, since she lacks functional mothparts and lives off the fat reserves of her body.

3. Observe the sides of the sack daily for egg masses. Each egg is cream-colored, with reddish-brown markings, and is about the size of BB shot.

4. When eggs appear, cut around the egg masses with a scissors, and transfer them to a rearing chamber made from a gallon jar. Gallon jars may be procured from the school lunchroom, as pickles and other food stuffs are commly packed in these containers.

5. After the egg masses have been transferred, observe daily for eclosion (hatching). If no hatching is observed within a month, the female is probably virgin. Riddiford, *et al.* (1973) reported virgin females depositing eggs after the third or fourth day of emergence. They also reported that virgin females layed about 7 percent of their eggs each day until they have mated and that after mating, egg deposition increased 36 percent.

6. After eclosion, food must be provided. Fresh host-plant food must be made available, although an artificial medium can be prepared (Levengood, 1968). Care must be taken to insure that food plants have not been sprayed with insecticide. Host-plant leaves should be sprayed with antibiotics as outlined by Riddiford (1967) to prevent disease epidemics. Riddiford recommends an aureomycin-kanamycin sulphate solution. In preparing the antibiotic solution mix 2.8 gm aureomycin with 0.155 gm kanamycin and dissolve in a liter of distilled water. Apply with a Windex sprayer. After feeding, the mouths of the jars should be covered with pieces of nylon stockings secured by rubber bands, to prevent the escape of larvae. Do not switch from one type of host-plant food to another.

7. At the end of each day, small caterpillars should be transferred to a clean rearing jar, using a camel's hair brush. Repeated dippings of the brush in the antibiotic (or even in alcohol) helps insure transporting infections from diseased to healthy larvae. Make certain the brush is *dry* (shake-well) before touching larvae. The old rearing jar should be scrubbed thoroughly and dried before re-use. This is necessary to help prevent infectuous diseases.

8. When the larvae have nearly completed their development, sticks should be placed in the jars to serve as pupation sites.

9. Rearing jars containing pupae should be placed in an unheated garage or enclosed porch for overwintering. Do not place the pupae in overly protected places, remember that cecropias normally pupate outdoors on the ends of twigs. Emergence can be observed during late May.

Discussion

The cecropia moth larva passes through five instars during its development. The first instar is black and "furry". After emerging from its egg, the larva will rear-up on its prolegs and sway back and forth in search of food. After feeding on the edge of a leaf, it will rest briefly and then defecate. During defecation, it may pull waste material from its body with its mouth. This waste masterial is a source of infectious diseases. If the frass of the caterpillars becomes watery, this is symptomatic of disease problems, and the extremes of sterile techniques must be used to prevent the spread of these infections throughout the entire rearing stock.

The second instar is yellow with small tufts of black hairs (setae) covering its body. The characteristic colors and markings of the mature larva do not appear until after the second larval molt. The third, fourth and fifth instars have a similar, generalized appearance. Figure 1 is an illustration of the final instar. As the larvae grow, they should be separated from one another to allow more growing space.

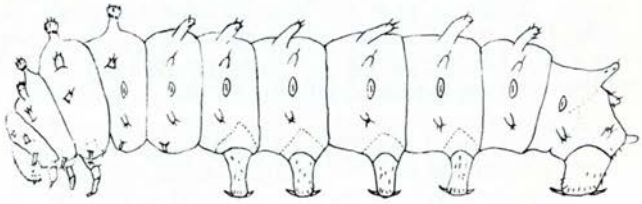

Fig. 2. Cecropia Larva (X .75).

Each instar stage is signaled when the caterpillars lose interest in feeding and fasten their anal prolegs down with silk. The caterpillars remain motionless for a time and then begin characteristic, pre-molt undulations with their heads bent in a tucked position. Late instars will require feeding four times a day. It takes approximately two months from eclosion to pupation.

Conclusion

Female cecropias lay from 200-300 eggs per female. Their larvae consume huge amounts of vegetation. My rearing experience started in June, with about 200 eggs from which approximately 175 caterpillars emerged. Thirty-three caterpillars matured and spun cocoons. From the 33 cocoons, four adult females were reared. Emergence occurred during May of the following year.

In the initial stages of the rearing program, host-plant leaves were sprayed with antibiotic solution. Due to the large volume of leaves consumed by late instar larvae, leaves were later dipped into the antibiotic solution. Observations indicated that feeding was inhibited by the leaves dipped in

antibiotic solution. Towards the end of the experiment, I ran out of antibiotic and many caterpillars died of infection.

Rearing cecropia moths from eggs, represents a challenge to both student and teacher. Much is learned about the mysteries of insect metamorphosis. High reproductive, feeding, and mortality rates are observed which are characteristic of most insects. Most important of all, this activity shows that the cecropia larvae are veritable eating machines that depend upon Iowa's forests to keep them alive. Cecropias have the reproductive potential to do economic damage if their life cycles were shorter and their mortality rates were lower. Thanks to these last two limiting factors they cause no serious harm to our forests.

References

Hussey, L. J., and C. Pessino. 1975. *Collecting cocoons.* Thomas Crowell Co. (children's book).

Hutchins, R. E. 1971. *Scaly wings.* Parent's Magazine Press. (children's book).

Levengood, W. C. 1968. Rearing a giant silkworm moth, *Hyalophora cecropia*, on artificial culture medium. *Ann. Ent. Soc. of Amer.* 61:1594-1596.

Riddiford, L. M. 1967. Antibiotics in laboratory rearing of cecropia silkworms. *Science* 157:1451-1452.

Riddiford, L. M., M. Lynn and J. B. Ashenhurst. 1973. The switch-over from virgin to mated behavior in female cecropia moths: the role of the bursa copulatril. *Bio. Bull. (Woodshole)* 144(1):162-171.

Swan. L. A. C. S. Papp. 1972. *The common insects of North America.* Harper and Row Publishers.

Tashenburg, E. F., and W. L. Roelofs. 1970. Large-scale rearing of cecropia. *Ann. Ent. Soc. of Amer.* 63:107-111.

* * *

Geology Teaching Aids

The U.S. Geological Survey has compiled two packets of geology teaching aids. ***Teacher's Packet of Geologic Materials*** is designed for secondary (and college) earth science teachers; ***Selected Packet of Geologic Teaching Aids*** is appropriate for elementary and secondary teachers of geography, social studies, general science, environmental education and oceanography. Request your free packet(s) on school letterhead, indicating grade level and subjects taught, from: USGS, Geologic Inquiries Group, Mail Stop 907, Reston, VA 22092.

* * *

When a chemistry teachers tells a joke to his class he expects a reaction.